Appendix 1

Information: potential applications of 7T MRI in PD

We identify six key applications of 7T MRI in PD, in areas which represent promise for future research and possible application in clinical practice.

(I)   Biomedical discovery. Due to its multi-parametric nature and ability to non-invasively measure anatomic, functional and molecular state with high spatial resolution, 7T MRI could play a role in future biomedical and disease-mechanism discovery in PD. Combined 7T MRI and electrophysiological studies could help to elucidate brain networks leading to manifestation of specific symptoms.

(II) Diagnosis. As shown above, studies are beginning to investigate the benefits of 7T for PD diagnosis, and early data suggest that it is a powerful tool for radiologists to accurately detect PD-related signs. Further work is needed in early and prodromal PD cohorts to test whether 7T MRI can expedite PD diagnoses.

(III) Surgical targeting. Studies show benefits of 7T MRI to DBS lead targeting. The recent rapid growth in application of this surgery will bring greater focus onto improved methods of targeting to lessen side effects and reduce the need for subsequent adjustments.

(IV) Tracking of progression. Improved methods for determining the state of PD progression are critical, and the capability of 7T MRI to accurately quantify iron content in small regions could be an important tool in this area.

(V)   Biotyping and subtyping. Although data in this area are scarce, early studies show the possibility of differentiating PD from other Parkinsonian syndromes.

(VI) Clinical trial endpoints. Multiple articles reviewed above propose that 7T MRI could offer useful endpoints for clinical trials, to determine the effects of new interventions on the PD brain.